


**TO-220 DARLING TRANSISTOR (NPN)**

**FEATURES**

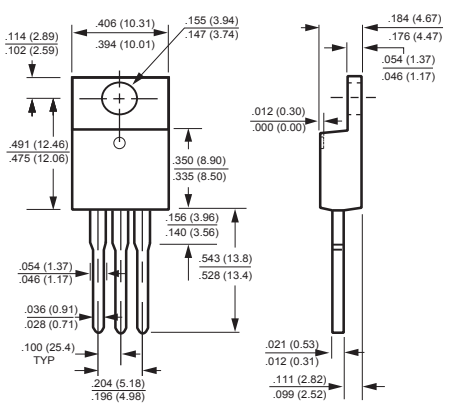
- \* Power application

**MECHANICAL DATA**

- \* Case: Molded plastic
- \* Epoxy: UL 94V-O rate flame retardant
- \* Lead: MIL-STD-202E method 208C guaranteed
- \* Mounting position: Any



**TO-220**



Dimensions in inches and (millimeters)

**MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS**

Ratings at 25°C ambient temperature unless otherwise specified.

**MAXIMUM RATINGS** ( @ TA = 25°C unless otherwise noted )

RATINGS	SYMBOL	LIMITS	UNITS
Collector-Base voltage	V <sub>CB0</sub>	60	V
Collector-Emitter voltage	V <sub>CE0</sub>	60	V
Emitter-Base voltage	V <sub>EB0</sub>	5	V
Collector current-continuous	I <sub>c</sub>	5	A
Collector Power dissipation	P <sub>d</sub>	2	W
Thermal Resistance	R <sub>θJA</sub>	62.5	°C/W
	R <sub>θJC</sub>	1.92	
Storage temperature	T <sub>stg</sub>	-65 ~150	°C

**ELECTRICAL CHARACTERISTICS** ( @ TA = 25°C unless otherwise noted )

CHARACTERISTICS	SYMBOL	MIN	MAX	UNITS
Collector-base breakdown voltage (I <sub>C</sub> = 1mA, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	60	-	V
Collector-Emitter breakdown voltage (I <sub>C</sub> = 30mA, I <sub>B</sub> = 0)	V <sub>CEO(SUS)</sub>	60	-	
Collector cut-off current (V <sub>CB</sub> = 60V, I <sub>E</sub> = 0)	I <sub>CBO</sub>	-	0.2	mA
Collector cut-off current (V <sub>CE</sub> = 30V, I <sub>B</sub> = 0)	I <sub>CEO</sub>	-	0.5	mA
Emitter cut-off current (V <sub>E</sub> = -5V, I <sub>C</sub> = 0)	I <sub>EB0</sub>	-	2	mA
DC current gain (V <sub>CE</sub> = 3V, I <sub>C</sub> = 0.5A)	h <sub>FE(1)</sub>	1000	-	-
DC current gain (V <sub>CE</sub> = 3V, I <sub>O</sub> = 3A)	h <sub>FE(2)</sub>	1000	-	-
Collector-emitter saturation voltage (I <sub>C</sub> = 3A, I <sub>B</sub> = 12mA)	V <sub>CE(sat)</sub>	-	2	V
Collector-emitter saturation voltage (I <sub>C</sub> = 5A, I <sub>B</sub> = 20mA)	V <sub>CE(sat)</sub>	-	4	V
Base-emitter ON voltage (I <sub>C</sub> = 3A, I <sub>B</sub> = 12mA)	V <sub>BE(on)</sub>	-	2.5	V
Output Capacitance (V <sub>CB</sub> = 10V, I <sub>E</sub> = 0, f= 0.1MHz)	C <sub>ob</sub>	-	200	pF

# RATING AND CHARACTERISTICS CURVES (TIP120)

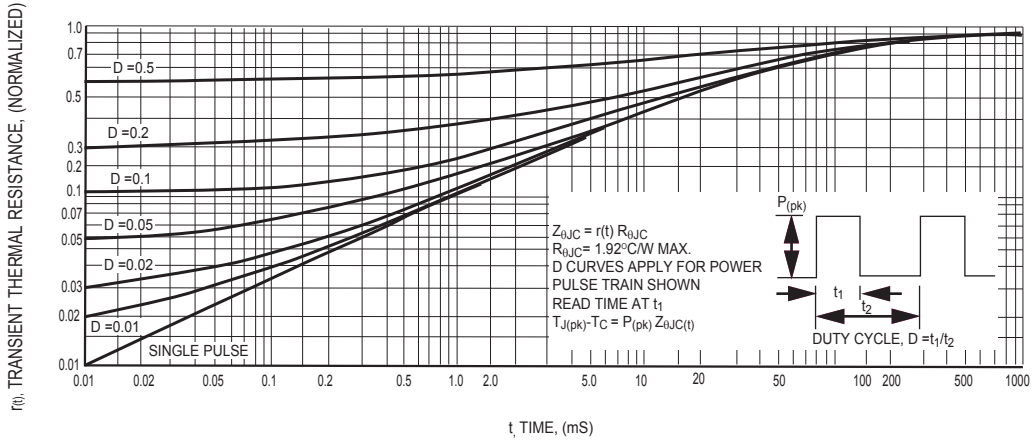


Figure1 THERMAL RESISTANCE

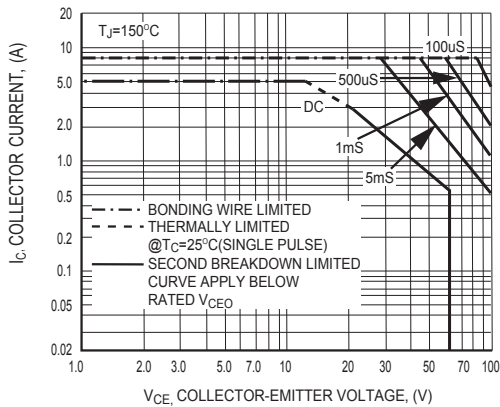


Figure2 ACTIVE-REGION SAFE OPERATING AREA

There are two limitations on the power handling ability of a transistor average junction temperature and second breakdown. Safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation, i.e., the transistor must not be subjected to greater dissipation than the curves indicate. The data of Figure 2 is based on  $T_{J(pk)}=150^\circ\text{C}$ ,  $T_C$  is variable depending on conditions. Second breakdown pulse limit are valid for duty cycles to 10% provided  $T_{J(pk)} < 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 1. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

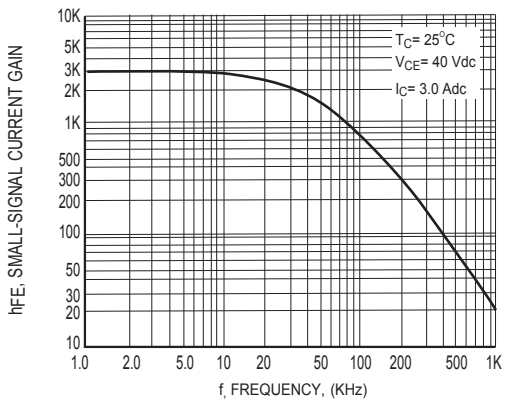


Figure3 Small-Signal Current Gain

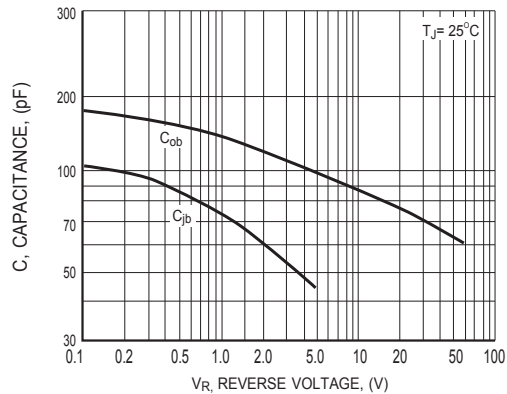


Figure4 CAPACITANCE

## RATING AND CHARACTERISTICS CURVES (TIP120)

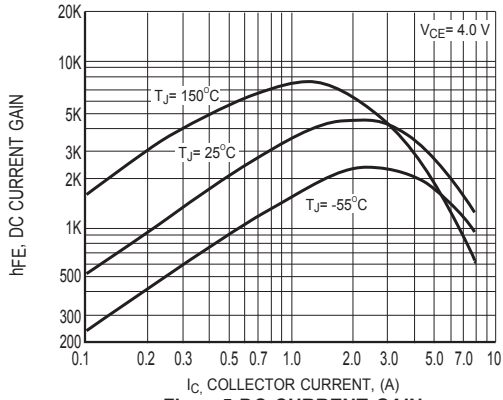


Figure5 DC CURRENT GAIN

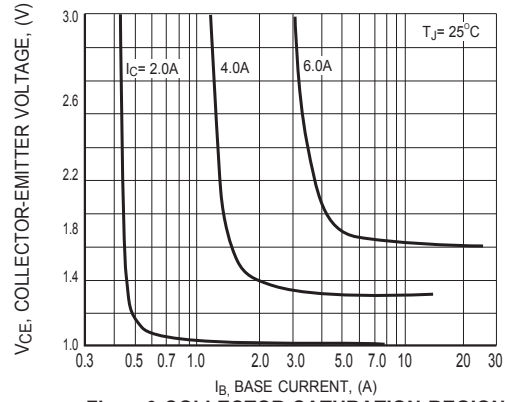


Figure6 COLLECTOR SATURATION REGION

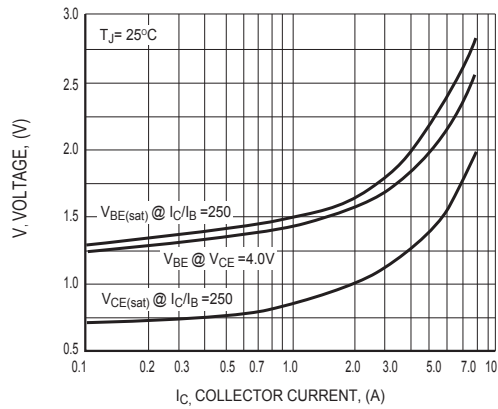


Figure7 "ON" VOLTAGES

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